

Worksheet: The Quotient Rule

This worksheet has questions about using **The Quotient Rule**: the method of differentiating quotient functions. Using the quotient rule is fairly common in calculus problems. Before attempting the questions below you should be able to differentiate basic functions and understand what a quotient function is.

Differentiating Basic Functions study guide



More Complicated Functions study guide



Quotient Rule study guide



Model Answers to this Sheet



$$\text{If } y = \frac{u}{v} \quad \text{then} \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

1. You can use the quotient rule to differentiate all the following functions. However, in some cases you can use simpler methods such as the product rule or even a basic function rule. Identify which method you would use to differentiate the functions and, for those using the quotient rule, suggest a suitable substitution for u and v .

(a) $y = \frac{x^5}{\sin x}$ (b) $y = \frac{x^5}{7}$ (c) $y = \frac{3e^x}{\cos x}$ (d) $y = \frac{\sin(3x)}{\cos(5x)}$
 (e) $y = \frac{-\sqrt{t}}{5\cos t}$ (f) $y = \frac{3}{e^x}$ (g) $y = \frac{\sin \theta}{\theta}$ (h) $y = \frac{5(3x-5)}{6e^x}$
 (i) $y = \frac{x^2-1}{x+1}$ (j) $y = \tan \theta$ (k) $y = \frac{3\sin 2\theta}{4\sin 2\theta}$ (l) $y = \frac{x^3-7x+3}{2}$

Check your answers and then differentiate the functions using the quotient rule. Find the gradient of each of the functions when the independent variable equals 2.



This worksheet is one of a series on mathematics produced by the Learning Enhancement Team.

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